were born to be the servants of God, and the companions of each other: as we sprang from the same parent, so we naturally partake of the same affections. We are brethren, sons of the same father: we are friends; for surely kindredship should be the most exalted friendship. Let us not then disagree, because our herdmen have disagreed; since that were to encourage every idle pique, and senseless animosity. Great, indeed, has been our success since our migration into this fair country: we have much substance, and much cattle. But what! shall brothers quarrel, because it has pleased Heaven to prosper them? This would be ingratitude, impiety! But if, notwithstanding these persuasives, thy spirit is still troubled, let us separate: rather than contend with a brother, I would, hard as it is, even part with him for a time. Perhaps the occasion of dispute (which I have already forgotten) will soon be no more remembered by thee. Is not the whole land before thee? Take then my blessing and my embrace, and separate thyself from me. To thee is submitted the advantages of choice; if thou wilt take the left hand, then, that I may not appear to thwart thee unbrotherly, I will take the right; or, if thou art more inclined to the country which lies upon the right, then will I go to the left. But as thou wilt, and whithersoever thou goest, happy be you and be!"

Lot listened to his brother, and departed. He cast his eyes on the well-watered plains of Jordan. When he separated, it appears to have been with hope of increasing his wealth: while Abra

it, I have said to myself, *This man gives too much for his whistle.*

When I saw another fond of popularity, constantly employing himself in political hustles, neglecting his own affairs, and neglect, *He pays too much for his whistle, indeed*, said I.

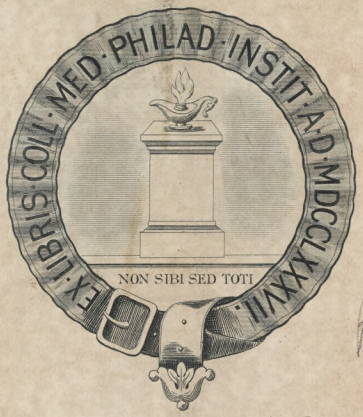
If I knew any kind of comfortable living good to others, all the esteem and the joys of benevolent accumulating wealth; *Poor man, you pay too much for your whistle.*

When I [illegible] sacrificing every laudable interest [illegible] fortune, to mere sensual gratification, said I, *you are providing pleasure; you give too much for your whistle.*

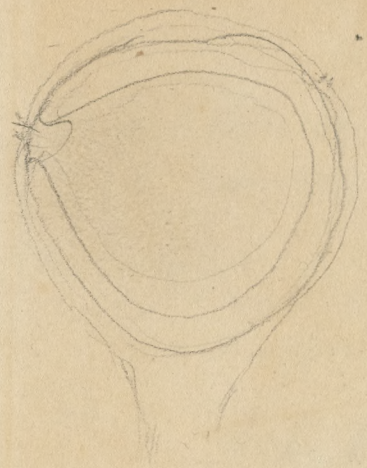
If I saw furniture, fine equipages, which he contracted debts, [illegible]; *Alas!* said I, *he has paid too much for his whistle.*

In short, [illegible] of the miseries of mankind, [illegible] by the false estimate they had made of the value of things, and by their giving too much for their whistles.

DR. FRANKLIN.



ubt, pressed his brother's hand; and often bade



Chapmans Lectures

Supplement

Vol. 1st. 1817

Physiology

1817.

Lect. 1st We are now to enter upon that section of our course which treats of the various functions of the animal economy, or, in other words, of Physiology. To arrange all the parts of so complicated a subject, in such a manner as to present a consistent exposition of the whole, is a task of no little difficulty. My plan differs very materially from any of those which have been adopted by others. Commencing with an account of the process of generation, I shall in succession expatiate on those circumstances which relate to the fœtal economy. This subject involves some of the most interesting speculations to which Physiology can give rise. — As soon as the child has escaped from the womb of the mother, it assumes a new & independent mode of existence. Next then I shall be to inquire into those means by which it is nourished & supported, & those by which it is connected with surrounding objects. First therefore let us direct our attention

to the subject of Generation. — Generation

To this term different meanings are attached in the various sciences that constitute the vast mass of human knowledge. By generation, however, we understand that process by which the human species is propagated; and so limited, we shall ~~to~~ now enter upon the discussion of it. It is peculiar to the living condition. Changes in dead matter are effected by laws contrary in their nature, & mode of operation. By providence it has been ordained that all living bodies should fall by the promiscuous hand of death. But the period of life is diversified in the different classes of animals. Some live a century, others only a few years, or months, days or hours. Even man with all his superior attributes & faculties is subject to the same unvarying & inexorable law. His body too dies & rots, like that of the meanest reptile that crawls the earth. Exempt from this dismal destiny, his soul alone partakes of the immortality of its God. But though individuals perish, the race is

preserves. The ranks are thinned by the ravages of time; but they are also filled by new creations. Deaths & births alternate in steady order. The moment that takes some away, brings others into existence; and, as an ancient poet expresses it, not a morning visits the globe without ~~to~~ being witness at the same time to the lamentations of the grave, and to the cries of the new-born infant.

Generation is the greatest mystery in the animal economy. Curious in every point of view, but more so as relates to ourselves, it has been investigated with great labour since the early ages. Notwithstanding the trouble which has been lavished upon it, we have still to regret the thick obscurity in which it is involved. The result indeed has been little more than the establishment of a few facts. But, as is always the case when a subject is imperfectly understood, an infinite number of futile hypotheses have been constructed, and promulgated in a

tone sufficiently confident & presumptuous. Considering the varieties in figure, structure, and economy in the vast chain of animated nature, it may easily be imagined how greatly diversified is the process of generation. To trace all the varieties would occupy more time than I can spare, & besides, would be encroaching on the province of Natural History. My intention, therefore, is to confine my observations to the process as it takes place in our own species, referring occasionally to the inferior animals or vegetables, merely to borrow for illustration some of the striking analogies which they afford.—

One of the few facts which have been indisputably settled, is that the ovaries are the seat of conception. As you will be taught by the professor of anatomy, each of the ovaries contains upon its surface a series of vesicles which are filled with a clear, pellucid fluid. Of late it has been shown, that after fruitful coitus, one or more of these vesicles ~~is ch~~

undergoes a change. The attenuation consists in a gradual enlargement, and loss of transparency; an opaque reddish hue, being substituted for the charms by which it was before characterized. After several stages of maturation, which are not inaptly compared to those of a small abscess, the vesicle finally bursts, & discharges its contents, which, ~~are~~ received by the fimbriated extremity of the Fallopian tube, are conveyed to the Uterus, there to be devolved, & perfected into the ~~tube~~ child. That these are facts we have ample evidence. The ova, in various animals, have been detected ~~into~~ in their passage to the uterus; and in the human subject, ~~it~~ we sometimes meet with extra-uterine conception; ~~when~~ in which the fœtus is either attached to some one of the abdominal viscera, or found in the Fallopian tube, or even in the ovary itself. Nor is it less certain that the change is effected by the fecundating influence of the semen masculinum. This point is as universally conceded as the former. But there is great difference of opinion as to the precise mode in which this influence

is extended to the ovary. By many it is maintained that the semen is taken up into the cavity of the Uterus, & conveyed to the ovaries without any material alteration in its properties. In the early seasons of Philosophy this hypothesis received the support of men engaged in musical pursuits, and owing to hasty & imperfect examinations is continued to the present day. My objections ~~is now to confute it in~~ to it will be confined to as small a space as possible. 1st. The semen does not enter the Uterine cavity, and under no circumstance does it ever penetrate so far as the ovary. They who entertain a different sentiment say in general that the semen is injected into the uterus in the act of coition. Other modes have also been suggested. Aristotle says that the womb sucks up the fecundating halitus of the semen, as the air is inhaled through the nostrils. Plato, ~~not to be outdone~~ compares the Uterus to a hungry animal which ~~sucks~~ devours its food with the same eagerness, as a hog would do its mess. Excuding

all in absurdity is the notion of a Modern writer who says that the os tincæ descends over the glans penis, exactly as the night cap is pulled on the head. Dismissing without comment these silly flights of the imagination, let us recur to the first hypothesis which possesses most intrinsic merit, & is supported by the greatest weight of authority. That the male organ has the power of projection is not denied: for this is plainly evinced by the manner in which the urine is discharged. When in the act of coition, however, this capacity is very much diminished, if not completely destroyed. Grasped tightly by the vagina, the propelling muscles of the penis are cramped in their energies, and unable to act so freely as when they are employed in projecting the urine. We have also in the tenacity of the semen another cause of resistance to its passage into the uterus. ~~The~~ Besides, the stimu=

x most gently backward towards sacrum

ture of the vagina instead of favouring, is calculated, by the rugæ on its inner surface, to obstruct such a passage. But even admitting that it is projected as far as the Uterus, how will it be able to enter the cavity of that organ? It should be remembered that the opening of the os tinsæ in virgin state is as small as the urethra in the male, & moreover is not in the axis of the vagina, but inclining either forward or backward, to one side or the other. Nor is this all. The mouth of the Uterus is filled with a glutinous fluid ~~exactly calculated~~ capable of resisting ~~to~~ the entrance of the semen, and where this is wanting the hard & unyielding lips of the os tinsæ ~~sides~~ are nearly closed. The passage in the neck is not much larger than a probe, & that part of it which is called the strait is still more contracted. Further obstruction is offered by the stricæ & the mucus which exist along this narrow canal ~~opening~~. Besides, the cavity of the Uterus itself is so shallow that its surfaces are

Cooper's speculations on Animal Reproduction

male as well as female

supported by Morg & c —

read from Wilmot &c

case by Lannuy — daughter urgent —

child N.a —

Simpson no os Lunæ — incised neck uteri —

nearly in contact. What has hitherto been said refers to the parts in a natural healthy condition. Other impediments arising from morbid or congenital deficiencies have sometimes occurred, which go to confirm the sentiment which I have advanced. 1st. The Penis has had its power of projection destroyed by various ~~disorders~~ circumstances, as by stricture, truncation, or anomalous openings along the urethra, by debility or relaxation ~~&~~. — 2nd. The vagina has been obstructed or closed by a cohesion of its sides, or by a membrane, or adventitious or by a tumour. — 3rd. The os tinæ owing to original malformation, or to inflamn. ~~has~~ has sometimes been impervious; and sometimes inaccessible to the semen, owing to obliquity, retroversion, or ~~some other derangement~~ prolapsus of the uterus. Cases have occurred in which impregnation has taken place under all these circumstances. — The above facts clearly demonstrate that conception ~~takes place~~ occurs though the semen be merely deposited within the vulva, and warrant the conclusion that as

a natural event it never ~~en~~ penetrate into the uterus. Nevertheless, to remove all shadow of scepticism, I will introduce what further light reason or experiment can throw on the subject. Experiments have been made by Haller, Harvey, De Graaf, Leuenhoeck, Haighton & others on different ~~occasions~~ animals. The ass, the cow, the ewe, the bitch, ~~the~~ rabbit, the dog ~~& the mare~~ have been inspected immediately after connection with ~~the~~ the male, and never, except in one ~~solitary~~ instance could semen be discovered in the womb. Haller says he discovered ~~it~~ it 5 min. after coition in the uterus of a sheep. This is a solitary case, however, & deserves little weight when we consider ~~that~~ it was in support of a favourite hypothesis of the ~~a~~ author. It is true that a story is floating about, which reports that Mr. Hunter found semen in the uterus of a bitch. But this is vague, & not mentioned in no where recorded not much insisted upon by the most strenuous advocates for ~~the~~ doctrine. In aid of Haller, however, it is urged that Morgagni ~~detected~~ semen, ~~& Ruysch~~ ~~Ruysch in~~ ~~&~~ in the uterus, & Ruysch in the Fallopian tube of the human species. Without impeaching the veracity

of these celebrated men, we may truly say that their observations stand in need of confirmation, & ~~that they are~~ may strongly conjecture that what they mistook for semen was merely the mucus of the part. But even supposing these discoveries to be real; what do they amount to? Contrasted with the vast body of opposing facts, they deserve not the slightest attention, and weigh only as the dust in the ballance. It appears then that the semen does not enter the Uterus, & of course cannot penetrate the Fallopian tube. The latter proposition is merged in the former. But to silence all cavil I will take a cursory view of these considerations which would induce me to believe such an event impossible, even though the semen should be applied to the mouth of the tube. That the Fallopian Tube was not made for this purpose, appears evident from its formation. Commencing in the Uterus by an opperture not larger than a bristle, it gradually enlarges, & ter=

minates in a wide fimbriated extremity. Now were it destined to convey from & not to the uterus, the reverse would have been the construction. It is known that it carries the ovum from the ovary.- By asserting that it also serves the former purpose, we invest it with a two-fold action, of which there is no ~~other~~ analogous example in the whole system. — The ~~peristaltic~~ inverted peristaltic motion of the intestines is the nearest, ~~to such an action~~, though this is not a perfect parallel. For it is a preternatural action, and cannot be brought forward in illustration of one which is natural. But it is unnecessary to protract the discussion; as the point has been completely decided by the observations & experiments of Haighton. He inspected several animals from 1 to 9 hours after coition, & found that the Fallopian tube was in its natural condition, with its fimbriated extremity hanging loosely in the pelvis; he also found that the tube never takes on the action by which it is enabled to embrace

the ovary, till the vesicle is matured, and ready to discharge its contents. He further proved by several experiments, that even if the Fallopian tube, previously to coition were so cut as to have its canal rendered impassible, ~~yet~~ the vesicles afterward showed evident signs that the ovary had become fecundated. — Convinced that the hypothesis in its primitive state was untenable, its advocates were forced to resort to the supposition of an aura seminalis, which penetrating through the Uterus & Fallopian tube, reached & fecundated the ovary. But here they were ~~not~~ opposed by such a body of facts, that they were driven back to the former theory. It might possibly happen that the aura would penetrate where the semen could not. But how are those cases to be got over in which the passage of the tube was rendered completely impervious, & in which nevertheless conception took place. Nor is

the only ones made for this purpose.--

this the only difficulty. I am not, however, disposed to enter into detail. It should first be shown that the aura seminalis has the power of fecundating. The experiments of Spalanzani & Jno. Hunter prove the contrary. — Distrusting the original hypothesis, another class of physiologists have resorted to the general circulation as the means by which the semen reaches the ovaries. There are two branches to this latter doctrine; but the difference is so little as not to be worthy of our attention. No one has shown that the semen in the blood retains its powers, nor if it does that it ~~[illegible]~~ is particularly determined to the ovaries. Is it credible that so small ~~a part as~~ a quantity, diffused through the whole mass of blood, would be productive of such effects as result from a fruitful coition. Much stress is laid upon the experiments of Spalanzani, who ~~[illegible]~~ having diffused ~~semen~~ a small portion of semen in ~~diffused a~~ a large quantity of water, fecundates ~~a~~

with a few drops of this liquor - a great number of the ova of frogs. - Were it as he states, it would be a conclusive fact. But subsequent experiments have proved that semen is not soluble in water. Any one may convince himself of this by examining the ponds, where he will find the ova of the female frogs, & the semen of the male floating on the surface. There are some ~~fish~~ species of fish, which ~~eject~~ inject the semen & the ova into the water, leaving them to be brought together by the accidents of wind & tide. After what I have said, it cannot be doubted, but that the results which Spallanzani obtained, were owing to his having entangled, with the point of his brush, some of the semen which was floating on the surface of the water. But what analogy is there between solution, and the combined operation of digestion and assimilation. To believe that the semen would retain its powers after having entered the circulation, is a stretch of credulity which is opposite both to the dictates of reason & the lights of analogy.

suggestions of experience

But this point is now beyond dispute. Experiments have decided that every article is entirely changed in its nature before it can enter the circulation. We should be warranted in this conclusion, were it only drawn from the fact that the mildest fluid, ~~injected into the blood vessels~~ such as milk, mucilage &c, when injected into the blood vessels, is productive of the most mischievous consequences. — The advocates for this hypothesis are not aware of the ridiculous conclusions to which it would inevitably lead. It follows from it, that generation might be carried on by ~~generation~~ inoculation; and that, ~~we might~~, by inserting some semen into the skin of a female, we might raise a flock of children as easily as we can produce a venereal bubo, or a ~~flock~~ crop of variolous pustules. — Harvey indeed maintains that generation is effected somewhat in this way. He believed that it was by a kind of contagion that the

semen acted so as to fecundate the ovary. — Not less absurd was the opinion of another physiologist that the semen passes from the toes of the male frog, through the axilla of the female into the organs of generation; nor that of a third, that in the coition of pigeons & sparrows, the female receives in her mouth the ~~semen of the~~ seminal liquor of the male. — We need not be surprised that such preposterous doctrines were adopted in the infancy of science, when we consider that hardly a day passes in which some ~~such~~ vagary equally absurd does not receive its supporters. — Even Linnaeus advanced the vulgar opinion that the female of certain fish follows the male & swallows the semen which he discharges. ~~The might~~ Such hypotheses might raise a smile if they were harmless, or if they were confined in their effects to those with whom they originated. — But they are far from being so. It is by them that learning

is brought into disrepute, and that our science is exposed to the sarcasms of the witty, & the contumelious reproaches of the wise & the circumspect. —

(2. 2) — A very ingenious speculator of our own country, convinced that the semen ~~or~~ does not pass into the uterus, advanced a conjecture, that there were a set of absorbents running between the vagina & the ~~uterus~~ ovaries, ~~and~~ destined for the purpose of ~~con~~ conveying the seminal liquor from the former to the latter ~~parts~~. Before such a deduction can be admitted, it must be demonstrated that absorbent vessels do run in ~~the~~ this direction, or some probable evidence of their existence afforded. None, however, has been advanced. On the contrary, we have every reason to believe that they do not exist. The Absorbents of the Vagina are as large, and have been demonstrated as clearly as those of other parts. There are two sets, one of which may be traced into the sacral, & the other into the inguinal glands; while not a single one ~~can~~ has been perceived running in the direction

of the ovary. Nor would the existence of the absorbents be a sufficient ~~proof that the semen re~~ confirmation of the hypothesis to which I have alluded. It must be proved that they do not as the others possess the power of digesting what they absorb, or we may infer that the seminal liquor, even if it were taken up, would be so altered in its progress, as to be rendered wholly inefficient. That the absorbents are possessed of this power, has been rendered ~~so~~ too manifest by experiment ~~that it can~~ to be denied. One of their provinces is to prevent noxious articles from entering the circulation unchanged, and they are generally competent to this end. When they are not so, however, the first conglobate gland arrests the further progress of the offending substance, and taking on inflammation, expels it from the system. These glands may be considered as sentinals, stationed to preserve the body from being injured by the entrance of any thing inimical to its health. As yet, therefore, the hypothesis must be considered as wholly grat-

uitous, built upon premises which cannot be proved, — by a course of reasoning which has been condemned by Bacon, Newton, — the disciples of that school of philosophers. Give me a spot, ~~on which~~ cried Archimedes in the enthusiasm of his genius, on which to fix my machine, and I will move the globe. Equally may the theorist exclaim, grant me my premises, and there is not one of the arcana of nature which I will not develop. Nothing is more easy than to erect hypothes=es: ~~but recollect~~ they arise ~~like~~ from a fertile imagination like exhalations from a pool: but remember that as these are destructive to health, so are ~~theories~~ false theories the bane of truth — the curse of medicine.

It results from what has been said, that the seminal liquor is not applied to the ovary, either by means of the Fallopian tube, or by the general circulation, or by the aura seminalis, or by a particular set of absorbents designed for the purpose. How then is fecundation accomplished? By that law ~~of~~ of the animal system which is called sympathy

or consent of parts. Be not startled at this assertion. When the theory is developed, you will confess that it has stronger claims on your attention than any which has been hitherto advanced. To Mr. Hay-Haighton, an experimental philosopher, distinguished & no less by vigour ~~of~~ and sobriety of intellect, than by vivacity of genius, we are indebted for this ~~in~~ beautiful specimen of inductive philosophy. It is regularly deduced from well established facts, and comports with all the phenomena of generation, with the changes which are ~~made~~ produced in the uterus, with the light of analogy, and with the laws of the animal economy. It has not, indeed, escaped opposition. No medical theory has ever been so perfectly constructed as utterly to defy attack. The penetration of adversaries will always find, or pretend to find some weak point, some imperfection in the structure, which they will ~~be~~ ever be ready to publish to the world. It is to be ~~defer~~ regretted that Mr. Haighton did not defend his theory. Contented with refuting others, he has thrown his own naked & destitute on the world, to rise or fall

according to its own intrinsic worth. As, however, the author has neglected ~~to g~~ the task, it becomes my duty, as one who have espoused the doctrine, to say a few words in its vindication. But before doing this, ~~let~~ let us gain some insight into the nature of sympathy. - Nothing is more certain, than that, in consequence of a sympathetic connection between the several parts of our frame, an impression made on one part, may be communicated to another, ~~[illegible]~~ or over the whole system. By some writers sympathy has been divided into several kinds, as the continuous, ~~the~~ and contiguous, remote & direct &c; distinctions, however, which are not necessary to our purpose. (see 1st. vol. of notes on Chapman page 7. & commencing at a mark near the bottom of the page, read to a similar mark in the next leaf.) There are certain organs more eminently endowed with this principle, & with which the system more powerfully sympathizes than others. Such are the brain, the stomach, and the uterus. So great, indeed, is the influence of this last organ over the ~~sys~~ frame, that

an eminent physiologist of antiquity considered it as a distinct animal, controuling the operations of the system, & giving to woman her peculiarities. ~~Two~~ At a comparatively modern period Van Helmont maintained that all the peculiar diseases of ~~to~~ the female sex are owing to this organ, and even went so far as to affirm that "Propter solum uterum mulier est quod est."

Two objections have been urged against the theory of Haxton. The first is, that it is contradicted by analogy. The experiments of Spalanzani, it is said, show ~~that~~ the ova are fecundated by the seminal liquor, as they are discharged by the female. Every one will admit the fact, that the business of fecundation in frogs may be artificially accomplished. But we cannot be too slow in adopting analogical reasoning in defense of a favourite theory. Analogy serves better as illustration than as argument, and should ~~be af~~ ever be appealed to with the most cautious circumspection. In the fres-

ent instance it is very remote, and the cases are entirely different. In the animal above alluded to, impregnation takes place out of the body, and nature could adopt no other course than that which she pursues. It is again urged that impregnation is effected in vegetables in the same manner. It may be so, though strong doubts with regard to the subject are entertained by many, and by Logan it was utterly denied. As regards some plants it is universally conceded, that the organs of generation are so constructed as to preclude the possibility of the pollen's reaching the pericarpium or ovary. In these conception must be accomplished by something like sympathy. The credit of arranging the sexual system is ~~generally given to Dr.~~ due to ~~Dr. L~~ Linnæus; but it was Dr. Logan of this city who first suggested the idea, and whose experiments respecting the generation process in corn, ~~based~~ were communicated to the Philosophical Society of London, before Linnæus wrote on the subject. —

It appears to me that analogical arguments

drawn from birds are deserving of much more credit than should be given to ~~other~~ those which are drawn either from frogs or plants. Here the process of generation is carried on in the body, and the structure of the organs is not very unlike that of the human species. — In birds the ovaries are situated high up in the spine; and they have the infundibulum which may be compared to the Fallopian Tube. Their uterus is long & convoluted like an intestine. In copulation the male being without a penis, or any power of projecting the semen, ~~must~~ merely deposits it within the vulva of the female. Notwithstanding this all the ova become fecundated at once. This fact, originally noticed by Harvey, has lately been ~~or~~ confirmed by ample experiments by Blyme & Spallanzani. Can it be credited that so extensive an impregnation is effected by the contact of the semen. Let it be remembered how long is the uterus, how high up in the spine are the ovaries, & how difficult of access. —

The force of this being admitted, it is still objected to the doctrine, that there are many ~~of the~~ phenomena of

generation for which it does not account, and that it is difficult to ~~conceive how impregn~~ imagine how conception can take place from sympathy. How, for instance, can ~~the~~ we explain by it the fecundation of the ova, ~~how~~ the resemblance of the child to the parent, ~~the~~ transmission of hereditary diseases, ~~the~~ production of a mule from the union of two animals of different species, &c. In every view of the subject we are involved in difficulty & obscurity. But are they increased by the doctrine which we are advocating. Does the ancient hypothesis of ~~the~~ direct application of the semen, unravel the perplexity? It does not afford us one ray of light, nor a single ~~thread~~ to guide us ~~to~~ through the labyrinth. Whatever ~~defe~~ then are the defects of this theory ~~they~~ will apply with equal force to every other. There are mysteries in conception which elude human research, & most probably will never be revealed. — It is obvious to me that the principal difficulty which opposes

the adoption of Mr. Hayton's theory, is the remaining prejudice of the Humoral Pathology. Of this much is retained even to the present day. By the Humoral Pathology it was held that all articles are conveyed by the circulation to the part on which an impression is made. Whether noxious or medicinal they were supposed equally to pursue this rout. No other way ~~was thought~~ by which they could act was thought to be conceivable, than by direct touch. — Let us now see whether we cannot render our theory acceptable even to the Humoral Pathologists themselves. — —

Whenever any agent, medicinal or poisonous is applied to a susceptible part external or internal, an action is excited which is extended more or less according to the diffusible ~~st~~ nature of the article, or to the degree of connection which exists between the part affected & the body generally. The action thus excited is the same, in the same system, by which P man in parts of a similar structure, or destined for a particular purpose.

If it run into other systems the action is disturbed, and broken by the different organization of the part. — To illustrate my meaning I will state a case. By inserting some variolous matter under the skin, we excite a local irritation, which in a few days is ~~followed by fever~~ diffused producing fever, & pustules are thrown out which resemble one another, because they ~~are~~ all occur in the same system or order of parts. In this way every morbid action is communicated, when the disease commences at a point. The matter is not infinitely divided in the mass of blood, but ~~the excites an action~~ in the ~~part to which~~ place where it is applied excites an action, which is propagated by sympathy over the system. Whatever operates on the living system is obedient to the same laws. There is one spot in which the action commences, from which as from a focus, it irradiates to every part around it. — By adopting these views, we have a satisfactory method of ~~accounting for~~ explaining the operation of the Seminal liquor.

The Uterus, Fallopian Tube, Ovaries, & Vagina constitute a system, between the parts of which there is a close sympathetic connection. Let us now trace the phenomena as they exhibit themselves after coition. Deposited in the vagina the semen begins its stimulant operation. This is quickly communicated to the Uterus, and finally to the Ovaria. In consequence, one or more of the vesicles enlarges, becomes red & opaque, projects, and at length bursting, discharges its contents. ~~by means of~~ In the mean time the Fallopian tube has been undergoing a change, which enables it to rise, embrace the ovary, & receive the contents of the vesicle as it bursts. This change consists in a gradual turgescence of the vessels, which renders it stiffer, & ~~gra~~ by degrees raises it from the cavity of the Pelvis. After it has performed its office, by conveying the ovum to the Uterus, it again returns to its former state. While these operations are going on in the appendages, others equally important are brought about in the Uterus itself. ~~It~~ That organ is engaged in fabricating the membrana decidua to afford a receptacle for the ovum,

to guard against the escape of which, the os tinea is completely closed by a thick, viscid mucus secreted for the purpose. Nor do the operations stop here. It is necessary to provide nourishment for the child after it shall have escaped from the womb; & for this end the breasts are gradually enlarged, & prepared for the secretion of milk. Every part of the above process has been so well ascertained by experiment & observation, as not to admit of doubt or disputation. Tracing, then, these actions through the Ovaries, Uterus, Fallopian tubes, and breasts of the mother, we shall find that they are links of a great chain, and that generation arises from that law of the animal economy which is called association, or sympathy. – That a portion of them, at least, is of this nature, cannot be denied. Every one must acknowledge that it is ~~by~~ from sympathy with the Uterus that the breasts swell. But if parts so remotely situated can be ~~so~~ thus affected, why should not the several

parts of the uterine system. Consider well what has been said, & you will not withhold your assent to a theory, legitimately deduced from facts well ascertained, & brightened by the light of reason & analogy.

Lect. 8 — I next proceed to the examination of what have been called the theories of generation. You are aware that on no subject has human genius been more actively employed, and on none more ineffectually so, than in the creation of hypotheses to explain this dark & intricate process. It is hardly to be credited, though it is indisputably true, that so long ago as 100 years, there existed no less than 262 theories relative to generation. It is not necessary to remind you that since that period, the fertility of invention has by no means been diminished, and that there has been a proportionate multiplication of doctrines. Do not imagine that I mean to conduct you through this obscure, & entan-

gled wilderness. The conjectures of the ancients being founded on the presumption of a mistura in the uterus, (an idea now entirely ~~explodes~~ abandoned,) or ~~of~~ being of a metaphysical nature, I shall very cursorily examine, or altogether omit. An acquaintance ~~with~~ with exploded doctrines may be knowledge, but, to use the language of the eloquent Burke, it is barren knowledge, a species of intelligence of no practical advantage. These theories have long since been shown to be the product of medical philosophy, when science was in her infancy, wrapped in her swaddling clothes, and rocked in her cradle. Numerous, however, as they are, they may all be arranged under 2 heads, or general divisions. (See Chapman's edition of Richerand page 536 & read from the beginning of his note to ~~about the mid~~ a mark about the middle of the next page.) It is humiliating to the lovers of truth & of science to dwell on the false reports which were made in support of particular ~~doctrines~~ by those

whose minds were perverted by ~~their~~ the ardour of their pursuits, or whose veracity was warped by their ambition to support ~~their~~ peculiar notions. No sooner had Leuenhoeck made the discovery of spermatic worms, than he & his followers, pushing their investigations still further, discovered, or pretended to discover their forms, structure, movements, & habitudes. He affects to have seen a million of these animalcula in a drop of semen not larger than a grain of sand. Dr. Darwin facetiously remarks with regard to these homuncula, that they must have been even more minute than the devils which are said, by one of the monkish legends, to have tempted St. Anthony, 20,000 of whom danced on the point of a needle. Conformably to the observations of Leuenhoeck the spermatic worms exist in the semen of all animals, in that of man, quadrupeds,

birds, fish, & insects. They are all long, slender, and apparently without extremities. They have considerable motion not only in their tails, but also in their bodies, so that they sometimes entirely change their position. All these points were corroborated by his pupils, some of whom went even further. One of them asserts that he saw with his own eyes a spermatic worm quit its covering, & become a perfect human being; and another declares with equal assurance that he had observed one of them in the semen, sitting in exactly the same posture ~~as the~~ with that of the fœtus in utero. — Even the enlightened Boerhaave so far bent under the weight of the prevailing infatuation, as to tarnish, if any thing can tarnish the brilliancy of his reputation. He says that he too saw, in the semen of a ram, a flock of animalcula pursuing one another ~~exactly~~ just as a flock of sheep, ~~can~~ when they are rushing

into a pen? — When, however, I state that ~~the~~ among the advocates for this doctrine were ranked the most intelligent philosophers of the age, you will readily agree with me that it ~~was~~ must have been plausibly made out, & powerfully supported. They who wish to inquire more particularly into the subject may consult the 3rd. volume of Buffon's Natural History. In the same work will ~~also~~ also be found a satisfactory refutation of the doctrine. This was long since repudiated, but has lately been revived by Darwin in a different form. After rejecting the commonly received opinion ~~that~~ the semen acts only as a stimulant, he maintained that ~~in secreting in the de-~~ ~~tail of the the men~~ the animalcula, which he called living filaments, were secreted from the blood with the seminal liquor, & served as the germ from which the future animal was to spring. But there is no such filament in the semen of the male. In that respect it is not different from the other fluids of our body.

If it contain animalculæ, these have nothing to do with the process of generation, but are of the same class with those which are found to pervade all nature, and ~~are~~ are designed to form one of the links in the great chain of animal existence. In constructing this theory he has evidently had his mind fixed on some plants & inferior animals, which ~~fact~~ are propagated by branches sprouting from themselves. On this deceptive analogy he seems to have founded his theory. Had he confined it to the species of plants & animals above alluded to he would have done right. He should have considered that the modes of generation are infinitely diversified, & have attended to what he well knew, that nature seems to take delight in varying the process in the different animals. We have now completed a view of the theories which suppose that the germ preexisted in the male. They are all overturned by the fact that the primary

step of ~~conception is in the~~ the generative process is in the o-
vary: for how could one of the spermatic worms reach
this organ through the long rout of the vagina, uterus,
& Fallopian tube. There was, however, one of the advocates
of the doctrine who pretended to have discovered one of
the ~~of~~ animalculæ in the very act of performing this
journey. In the progress of my lecture I remarked that the
ovular doctrine ~~has been~~ was refuted by Leuenhoeck.
After a while, however, it again revived, under the aus-
pices of Haller, &c. (See page 585 of Chapman's edition
of Richerand, and begin to read about the middle of
the page & read the paragraph.) They rest their ~~conclu-~~
~~sion~~ theory upon ~~their proofs~~ the following propositions
deduced as they say from experiments. 1st. In viviparous
animals the germ preexists in the vesicles of the ovaria;
2d. In oviparous animals it preexists in the cicatricula
or vesicle attached to the yolk of the egg: 3rd. In

amphibious animals, as the frog, newt &c. it is to be found in the black points of the mucus discharged by the female; 4th. In fish it preexists in the spawn; 5th. In insects it is in the egg; 6th. In plants, it is discoverable in the seed. Thus they make the ovular origin universal in both kingdoms. Admit the above propositions, and their doctrine is established. But it is not true as they assert. The germ does not preexist, and ~~not is so~~ it is not allowed to do so by any of the opponents of this theory.

In support of the evolutionary hypotheses microscopic observations have been introduced. The subject, indeed, seems to admit of no other mode of investigation. Could we confide in the reports that have been made, it would be difficult to resist the evidence in favour of the doctrine. But unqualified assertions are always enough of themselves, to awaken suspicion. A germ, which is almost too small for the ~~com~~ power of figures to express, has been delineated

with all the accuracy that a naturalist would use in describing an elephant or Rhinoceros. Is this reality or illusion? ~~It~~ ~~There a rule of~~ There is a rule of law, found by ~~[illegible]~~ experience to be correct, Quod probat omnis, probat nihil.

— By the opponents of the doctrine which maintains that the germ preexists in the female, the ovaria have been scrutinized, & with a contrary result. They aver that neither by the naked eye, nor by the most powerful glasses have they ever been able, in one single instance, to discover any thing like a germ. They say that the capsule of the vesicle contains a transparent, homogeneous fluid, which never takes on action, till it has been excited by the fecundating influence of the male semen. — How are we to determine between these contradictory statements. — First, let us rid ourselves of the weight of authority, and all ~~[illegible]~~ our prejudices; next let us examine the subject & see which ~~[illegible]~~ doctrine is most consistent with established facts. I must

confess my own utter incredulity with regard to preexisting germs. Each branch of the theory is equally incorrect. — Bear in mind that they both suppose the germ to be a miniature of the parent, differing only in being on a smaller scale. Such, however, is not the primative appearance of the embryo. In its early state the fœtus is a "Rudis et indigestaque moles". From this rude, imperfect condition, in which hardly any signs of organization appear, it is ~~dwell~~ developed by a slow & gradual progress. The primary aspect of the human embryo bears no resemblance to the figure which it is destined to adopt. The same occurs in other animals. In what is the tadpole like a frog; the chrysalis like a butterfly; the pullulating shoot like the perfect plant? Do we in these see an ~~perfect~~ exact ~~miniature~~ of the ~~future~~ parent's form? — But this is not the only objection. It is impossible to reconcile with the doctrine of a preexisting germ, the recovery of lost parts. Yet the Polypus

has this property, & it exists also, though in a less degree, in the more perfect animals. No one will say that Nature, foreseeing such ~~an~~ an accident, ~~pro~~ has provided another germ. Yet this is the only way of escaping the difficulty. Nor is the production of hybrid animals more intelligable by the doctrine on which we are animadverting. If the germ preexists in the horse or the ass, how does the mule happen to be an exact compound between the two. How, in our own species, are we to account for the existence of the mulatto. Supposing the germ to have been in the father, how should the child resemble the mother, & vice versa. How are we to explain the inheritance of certain diseases, as gout, scrofula, rickets &c. Temperament, disposition, & peculiarity of ~~con~~ structure may all be inherited from either parent. Sometimes the child both in mind & body is an almost exact compound of his parents. To get out of these difficulties some speculators have attributed

* (Insert) The loves of plants make a conspicuous figure in poetry, but the vigour of their imagination remains yet to be proved. —

a plastic power to the semen, by which it moulds the embryo into certain forms. But if this faculty be given to the seminal liquor, what becomes of the perfect miniature? The influence of the mind has also been called in to assist in explaining the phenomena. To this we may reply, that whatever power the human mind may possess over ~~the~~ conception, very little influence of this kind can be attributed to the lower species of animals & to plants.* So much for the doctrine of preexisting germs. It is highly plausible, & were it just, would not fail to obtain many admirers & followers. —

Lect. 4. I have now completed what I had to say on the doctrine of the Evolution of the germ; and I think I have shown, that however plausible, it possesses no solid claims ~~to our appro~~ which can entitle it to our approbation. The next theory ~~and~~ that comes under our notice is that of

Epigenesis. Discarding, as I have already hinted, the notion of the preexistence of the germ, it presumes that "the prepared, but at the same time unorganized rudiments of the fœtus, first begin to be gradually organized when they arrive at their place of destination, at a due time, and under the necessary circumstances." In other words, denying the preexistence of germs in either parent, the doctrine of Epigenesis supposes, that the fluid contained in the ovarian vesicle is the rude elementary matter which, after impregnation, becomes organized into an embryon by the energies of the semen masculinum. The primary traces of this doctrine are to be found in the writings of Aristotle. The prevailing opinion on the subject of generation, in the time of this philosopher was, that each sex furnishes semen, — that the embryon results from the mixture of these fluids in the cavity of the uterus. After confuting the popular idea that women have semen, he asserts that they contribute nothing towards conception, except the menstrual blood: that the rudiments of the embryo are derived from the menses,

✱ Fr von Blumenbach. —

and are vivified & put together by a plastic power, which he imputes to the semen. ~~With various modifications~~ Thus according to his doctrine the seminal fluid is the sculptor, the menstrual blood the marble, & the fœtus the figure. With various modifications this hypothesis has been handed down to us. It would be impossible to point out all the shapes which it has assumed at different times. Of late, its most able & determined supporter is Blumenbach. I will read you his own account of his doctrine.* In other words we might thus enunciate it:- the male semen, and the liquor which is secreted by the ovaria of the female, are mingled in the uterus, and formed into the fœtus by the energy of ~~the~~ vitality, or as he denominates it, by the "nisus formativus". This hypothesis in the outline appears not very remote from the truth; but in filling it up he has committed errors of so gross a nature as to impeach his reputation ~~for reputation~~

as an accurate Physiologist. — It is not true that a commixture of the seminal fluid with that of the ovaria takes place in the uterine cavity. On the contrary it is a well ascertained fact that the semen ~~enters~~ never enters the uterus; nor is it less certain that the albuminoid liquor of the female does not reach that organ till a considerable period after fecundation, perhaps 20, 21, or 22 days. Tired with criticisms on this subject, I shall not delay to point out all the errors of the doctrine which has last come under our notice. My own conviction, which, as you may readily perceive, is the result of much inquiry, and ~~of~~ reflection, may be stated in a few words. I believe that the ovary is a gland which secretes the rudiments of the embryo. These ~~are~~ at first consist merely of a pellucid fluid contained in the vesicles of the ovary: but in consequence of the influence of the semen masculinum, extended I believe by sympathy, life, organization, & figure are communicated to the rude materials.

That the ovary performs this office admits almost of demonstration. Experiments have most clearly shown, that at the age of puberty, ~~that~~ this organ takes on a secretory action, & pours a pellucid fluid into the vesicles, which ~~is made to~~ undergoes a change ~~in the act of~~ at every fruitful conception. Thus altered it is introduced into the uterus, where by subsequent elaboration, it is converted into the fœtus. Do we not see the egg perfected by the ovary in all the parts necessary to conception, & requiring only the fecundating influence of the semen masculinum to render it prolific. By analogy, then, as well as by experiment we are assured of the truth of ~~the~~ this doctrine. Nor is there less evidence to prove that the contents of the vesicle are moulded into shape by the agency of the seminal fluid. It cannot be doubted but that this to a certain extent possesses a plastic energy. —

The fact indeed is manifested by the revolution which the system undergoes, when it first receives the impression of the semen; and will not be doubted by any one who is not exceedingly inobservant, or irrationally sceptical. At the period of puberty several very striking alterations take place. Hair grows upon the ~~chin~~ & pubis, the beard begins to appear, the voice for the first time becomes harsh & dissonant, the countenance contracts a new expression, the form generally improves, and a striking change is observeable in the dispositions of the heart, & the faculties of the mind. The powers of the semen may be still more strongly illustrated by comparing the castrated animals with those which retain their functions entire. But why occupy our time with the relation of instances which must be familiar to all of you. With

regard to the nature of the seminal agency we are not well informed. Semen is a peculiar fluid producing effects sui generis. The same language we are compelled to hold with regard to other substances. It is as difficult to explain the operation of the variolous matter in producing small pox, or of mercury in curing Syphilis, as of the semen masculinum in effecting the changes which depend upon its influence. -- I have nothing more to say on the subject of ~~the ovum~~ generation. What ~~has~~ I have said has been advanced with diffidence, on ~~acc~~ account of the peculiar obscurity & difficulty of the subject. - The whole ground is now before you & you must judge for yourselves. But whatever opinion you adopt, it will undoubtedly be some modification of the doctrine of Epigenesis. Compared with the other it is decidedly superior. It comports better with the phenomena as they have been detailed, &

affords a solution of circumstances which are irreconcilable to the pre-existence of the germ either in the ovary of the female, or in the ~~or~~ semen of the male.

— In the prosecution of our inquiries the demonstration or rather the description of the ovum comes next in order. By this we mean that sac or bag which is found in the gravid uterus, inclosing the foetus, & its appendages called the secundines. But before proceeding further it will be proper to discuss a point or two of importance. As yet it is doubtful in what form the ~~contents of the ovum~~ rudiments or primordia of the foetus are transmitted from the ovary to the uterine cavity. By De Graaf & the supporters of the ovular doctrine it is maintained that they are a true & perfect ovum ab initio, or from the time they escape the ovaria. But Tarielli & many of his cotemporaries held a contrary ~~doctrine~~ sentiment. It is denied by Haller

*From last year's notes. —

In weighing the evidence of both parties, I confess it seems to me the most probable occurrence, that the discharge from the ovaries into the uterus is a mere fluid without any investing membrane. The Fallopian tube is so small,

that they have any vesicular structure till they have arrived in the cavity of the Uterus, & have remained there several days. The same account is given by Haighton. As the researches of these two last were undertaken with prepossessions contrary to the result, they deserve the more attentive consideration. It is due, however, to candour to state that there were not wanting many eminent Physiologists who supported the opinions of De Graaf. Among these is the celebrated Cruickshanks, whose observations were no doubt made with great care. When circumstances so contradictory occur, it is often very hard to decide between them. (See Vol. 1st. of Notes on Chapman. 1st. page of lect. 6. * and read to the lower part of the third.) From my own observation I can bear testimony to the fidelity of this representation. I once had an opportunity of ~~an a~~ ~~early abortion~~ examining the products of an abortion, which took place the 20th. day after

that it would seem almost impossible that anything but a fluid should pervade it. May we not account for the conflict of opinions on this point, by supposing that the thick albuminous fluid which the Ovaries pour into the Fallopian tube, receives a globular form in its descent, & thus deceives those who mistake it for the real ovum. From this circumstance, independent of the experiments of Haller & Haighton, it would seem probable that their opinion is the true one. Equally disputed is it, at what period after fruitful coition, the rudiments enter the uterine cavity. In the brute creation, this point is easily ascertained. But so various are the laws which govern the different species of animals in this respect, that it would be impossible, from what is observed

menstruation. The ovum was about the size of a nutmeg; the coats were transparent, and distended by the liquor amnii which was as clear as water; the embryo ~~was as large as~~ resembling a large ant was visible floating in the liquid, and suspended by a chord ½ an inch in length, as ~~fine~~ delicate as the finest thread. The little fœtus was divided into two nearly equal portions by a ~~s~~ fissure that surrounded it. It is much to be regretted that the products of early abortion, have not been more frequently subjected to examination. — The lights of Comparative Anatomy, however, may, in some degree, compensate for the want of more accurate knowledge. To these then we must appeal. De Graaf declares that in the uterus of the rabbit, he was unable to discover any thing like the rudiments of the fœtus before the 8th day; and that then it appeared ~~like~~ as a small cloudy speck situated in the centre of the ovum. On the 9th day it had become more dis-

in the lower species, to draw any certain inference relative to the human. – As examples of this difference I will just state, that in the uterus of the rabbit, whose period of gestation is 30 days, the primordia of the fœtus are discoverable on the 5th.; a little more than the same ~~period~~ time elapses before the ovum is found in the deer, whose pregnancy continues during 9 months; while the ewe, which produces 5 months after fruitful coition, does not contain the ovum in her uterus before the 18th. day. In our own species, from the best testimony which I can collect, I conclude that 3 weeks pass before the rudiments of the child are to be found in the uterine cavity. This conclusion is the result of modern in-

tinctly visible; and went on increasing till the 12th. when he discovered ~~the~~ signs of the head & extremities, and observed 2 red points in the thorax. On the 14th. the head was formed, the eyes were ~~open~~ prominent, the mouth open, ~~and~~ the ears distinguishable, and the trunk elongated. The punctum sanguineum had increased, & now evidently appeared to the rudiments of the ventricles of the heart; and on each side was seen a white spot, representing the right & left lobes of the lungs. On opening the abdomen he found the germs of the stomach, intestines, liver, spleen, & other viscera. After the 14th. day the parts rapidly advanced till the 29th. when the whole was completed, and the ~~young rabbit~~ rabbit delivered. All the above circumstances were confirmed by Mr. Haighton, who with his accustomed accuracy repeated the experiments. He stated that he could never discover any

vestigation. Anciently it was believed that the liquor of the ovary descended immediately at the time of coition. Buffon has gone so far as to give us a picture of the fœtus, when 1 week old, delineating even its features; but this is entirely the creature of his own fancy. The primordia, when first observed, appear like a cloudy speck, contained within a duplicate bladder, & suspended in a quantity of pellucid fluid. Not long after this period, the embryo becomes more organized, but still is very imperfect. - Soemmering says that between 3 & 4 weeks after conception, the ovum appears invested with 2 membranes, the corion & the amnion, which are larged with a fluid, & measure in diameter about 5 lines. — When washed with spirits of wine,

~~they~~ in the Uterus earlier than the 6th. day, and that ~~we~~ then there was only a cloudy appearance; but the 10th. an opaque spot was to be seen, which progressively increasing in bulk, at length became developed, and at the usual time was perfectly formed. It is surprising that when the term of utero-gestation is limited to so short a time as 1 month, a third of the time should be appropriated to the production of entity. It seems to require almost as much time to ~~fo~~ form the nucleus, as it were, of the fœtus, as to ~~go~~ go on & complete the work. Experiments on eggs were attended with the same results. Harvey informs us, that till the 5th. day there is no appearance of the ~~ab~~ embryo, and ~~that~~ ~~it~~ even then ~~of~~ ~~was~~ it is hardly discernible; being ~~like~~ a mere line, (which he compared to the keel of a ship or to a worm) having a smaller body ~~also~~ representing the head, attached to one end.

a small speck or line is seen suspended by a chord
& the superior & inferior extremities appear
like the germs of a plant. —

On the 6th. day, ~~he states that~~ the head becomes prominent, the legs begin to appear, and the germs of the abdominal viscera are observeable. It is mentioned by him that the heart is first seen & then the lungs. From this time ~~to the 20th.~~ the chick gradually increases ~~to the 20th.~~ when the term of incubation is completed. These experiments have been confirmed by ~~other~~ conducted under my particular notice, by a graduate of this University. — To the question whether the blood exists before the heart & arteries, Harvey answers unequivocally in the affirmative. But his experiments do not afford sufficient grounds for so positive a conclusion. We shall, it is probable, never be able to satisfy ourselves on this subject. The subtlety of the subject is so great as to elude all our researches: nor can we gain anything by a priori reasoning. It may, indeed, be urged in ~~fa~~ support of Harvey's opinion

be urged that every part which enters into the constitution of the body, is derived from & supported by the blood. But it may be objected that the blood is the production of an elaborate process, in which the heart & arteries are concerned, and cannot, therefore, have a priority of existence. Happily, however, such questions are more curious, than ~~useful~~ important in a practical point of view.

The Fœtus occupies that position in the Uterus which takes up least room. The trunk is bent forward, the chin is pushed down on the breast, the feet are drawn up, the thighs applied to the Abdomen, and the arms cross each other. Till lately it was thought that the Fœtus at first sits upon its posteriors in the Uterus, ~~till it about the~~ and about the 4th. month, by ~~a~~ performing a kind of somerset, assumes the posture which it is observed to have at delivery; viz. with the head downward. No question ever engaged more closely the attention

of Physiologists, nor excited more warmth of discussion, than in what manner the fœtus performed this motion. At length a person more cautious than the rest, settled the dispute, by proving that the position is ~~[illegible]~~ not altered, but that it remains the same during the period of gestation. During the reign of Charles 2nd, that monarch, who was of a facetious disposition, proposed to the Philosophical Society a question to be solved; - Why a dead fish sinks in water easier than a live one. The members, willing to please the King, appointed a committee to examine into the subject, who were totally unable to find an explanation. They waited on the monarch with a declaration that they could not solve the question: his answer was, Go and try the experiment. —

* See in the 1st vol. of notes on Chapman ~~some~~ in the 7th. lecture, some remarks relative to the size of the ovum at different periods, which have been omitted this year. —

"I remarked on this subject, that, from the best evidence, (tho' the point could not be demonstrated,) the time which elapses from the period of fecundation to that in which the primordia are 1st discovered in the uterine cavity, is about 3 weeks.

The first thing perceived at the end of the 3rd week is a small speck enveloped in mucilage. This speck after a while ~~appears~~ assumes an ovular appearance, and increasing, exhibits at length the fœtus itself about the size of an ant suspended by a chord as fine as a hair. At the expiration of the 6th. week, the most common time of abortion in women, we find the child about the size of a common

Lect. 5.* In the present lecture I shall enter into the subject of the nourishment of the Fœtus in Utero. It is perfectly known to all of you that this is one of the most intricate, & least understood parts of Physiology. As preliminary, however, to the main point, it is necessary to say a few words on the ovum & its appendages, the Decundines. It has already been mentioned, to ~~you~~ that you are to understand by the ovum, a membranous envelope or sac, found in the cavity of the Gravid Uterus, and containing the fœtus & its appendages. It consists of 3 membranes, 2 of which are peculiar to the fœtus, and the third the production of the Uterus. The first two are called the Amnion & the Chorion. ~~The former~~ These in the latter stages of pregnancy are closely in contact with each other; but at first are slightly seperated by the intervention of a mucilaginous matter. The amnion is the internal membrane, & situated next the child; and serves as a lining for the ovum. Next is the Chorion; and on the outside of this is the reflected portion of the Decidua. As to the production of the Decidua, which forms the external coat of the ovum, much difference of opinion has existed,

bee, & weighing a scruple. At this time very little appearance of the human form exists. The fœtus seems to consist of 2 portions joined together, the one representing the head, the other the trunk of the body. The features begin to be somewhat though very indistinctly marked. The eyes are prominent, a line is visible representing the mouth, small protuberances appear which are to form the ears & the nose, & the upper & lower extremities begin to fullulate. After 6 weeks the child grows with more rapidity, & its parts become very speedily developed. From the 5th. month its increase is still more rapid. At the 6th. month it is about 9 inches in length & weighs 1 lb. At the 7th. it has increased to 12 inches long, & weighs 6 or 7 lbs.; by the 8th. it measures 15 or 16 inches & has a proportionable increase in weight. At the expiration of the 9th. month,

It is now well ascertained that when the conception takes place in the ovary, the Uterus assumes a new action, the ~~real~~ object of which is the fabrication of this membrane. By Haller it was stated that vessels sprout out from the surface of the uterus, which are interwoven with one another, and thus produce the decidua. By Jno. Hunter it was attributed to the coagulation of the blood. His brother Dr. Hunter says that it is the result of an efflorescence of the uterus. The prevailing opinion at present is that it is the production of an action similar to that by which the membrane of inflamn. is formed. Scarpa avers that he has made experiments which render this certain. I do not know the experiments; but there are certainly some circumstances of resemblance between the 2 membranes. They have the same colour, ~~are both tender, pulpy, & vascular~~ and texture, each being tender, pulpy, & vascular. The membrane of coagulable lymph is formed by the process of inflamn. The uterus, when employed in fabricating the Decidua is in a state of high excitement. But here the resemblance ceases.

which in our species is the general period of delivery, the infant weighs from 7 to 12 lbs. & is from 15 to 21 or 22 inches long.

The membrane of inflam.^n exists only a short time in its original form, ~~but it~~ being soon converted into the common cellular membrane of the body; while the other ~~is~~ exists for a considerable time, and performs ~~actions~~ a function sui generis. We are not then warranted in attributing to an identity of action substances so different in their offices or powers. The Uterus may be excited, but not in a state of inflam.^n There is no affinity between increased or natural action, and one which is the consequence of disease. We must, therefore, consider the Decidua as a peculiar membrane, the result of a specific operation of the Uterus. Embarrassed as physiologists have been ~~to explain the production of the~~ on this point, they are no less so in their attempts to explain the reflected portion, or that which forms the envelope of the ovum. To me, however, there does not appear to be any great difficulty. The Decidua which, before the entrance of the ovarian fluid, gives a complete lining to the uterus, is composed of two layers. That which lies next to the uterus is perforated at two places, where the Fallopian tubes open;

and the other is entire, having no opening in it. Now when the contents of the vesicle reach the mouth of the tube, one of three things must happen. ~~Either it must be~~ The ovarian fluid must either be arrested at this spot; or it must lacerate the internal membrane; or it must protrude the layer before it. The last circumstance really happens; and ~~as~~ the ovum is at length covered by the protruded membrane. Hence the portion which ~~could~~ envelops the ovum is called Decidua reflexa, and that which lines the uterus, Decidua vera. — The animal economy affords one operation in a striking manner analagous to this; I allude to the descent of the testicle into the scrotum. In the fœtal state this gland lies on the spine, posterior to the peritoneum. In its descent along the back it pushes this membrane before it, till at length it reaches the scrotum, where the peritoneal covering is denominated the Tunica vaginalis. Precisely in this manner does the ovum protrude the Decidua before it, forming for itself a reflected covering. —

The next point which must receive our attention is the formation of the placenta. In order to comprehend this, it is necessary to call to mind, that the ovum is completely invested by the reflected portion of the Decidua, between which & the Chorion an intimate union takes place, ~~and~~ by means of ~~vessels~~ the inosculation of vessels. That such an union exists may be demonstrated by maceration. — The Decidua & Chorion thus connected form a bed or matrix, exceedingly soft & pulpy in its nature. Into this bed the vessels of the Umbilical Chord enter, & ramify in all directions: while, on the other hand the vessels of the Uterus do the same. This also may be demonstrated by maceration. After a while cellular membrane is formed, which is interposed between the vessels of the Umbilical Chord, & those of the Uterus; and ~~the~~ of the whole structure becomes parenchymatous, having a striking resemblance to that of the lungs. —— The placenta is found in all the more perfect animals; but it is extremely diversified in its structure. In some the vessels terminate in the

ovum, without any intervention of cellular membrane. In other quadrupeds, as in the mare, the uterus throws out small prominences, which are received in corresponding depressions in the fœtal portion. The depressions, from their resemblance to cups, are called cotyledons (little cups), & the projections are denominated papillæ. In a third class, as the dog, cat, rabbit &c. each fœtus has an independent placenta, in a particular cell of the uterus. — There is ~~an~~ another point in which the placenta in the human species is different from the same organ in ~~other an~~ the brute animals; ~~I mean~~ I mean, in its being caducous, that is, coming away with the fœtus & the secundines. In no other species, with the exception, perhaps, of the monkey, is the whole placenta shed. The fœtal portion alone comes away. I shall add no more respecting ~~the~~ it at present, ~~than that~~ it serves as a connection between the mother & child. The umbilical chord which ramifies in it, is, in general, composed of two arteries & one vein, in the human subject. —

To complete our account of the ovum & its appen-

dages, I will say a few words relative to the liquor-amnii; or that collection of fluid which exists within the cavity of the amnion. During the early period of pregnancy it is pure & limpid; but afterwards it becomes contaminated, and sometimes, ~~dark~~, from mixture with the meconium, extremely dark, putrid, and offensive. There have existed various opinions relative to its origin. It has been supposed to be the perspiration, urine, saliva, and even the mucus from the nostrils of the child. But the liquor-amnii cannot proceed from the fœtus; for it exists in large quantities before the organs which could have produce it are developed; and it is to be found in cases where the ova has been blighted, and the fœtus possesses no organization. By Haller it was thought to be a secretion of the uterus, which transuded through the membranes of the ovum. But independent of the great doubt whether there is such a thing in the human system as transudation through a membrane, how can this sentiment be reconciled with the fact that the liquor-amnii exists also in extra-uterine conceptions. — It seems to me most probable

that it is an exhalation from the arteries of the Amnion. With regard to its uses a variety of sentiments has been entertained. It was once supposed that this liquor served for the nourishment of the fœtus: but there is no foundation for such a supposition. Its uses are two-fold; ~~to~~ In the first place it protects the fœtus from compression, and gives it room to extend itself by growth. Secondly, it promotes labour by gradually enlarging the os tinæ, (which it does by being pushed downward & insinuating the membranes like a wedge,) and moreover keeps the uterus distended, ~~off~~ thereby enabling it to act with more force. — We see this last ~~ad~~ advantage exemplified by the tedious & difficult labours, which result from a premature rupture of the membranes. I have only further to add relative to the secundines, that they possess no apparent vascularity, except the chord, placenta, & Amnion and that no absorbents nor nerves can be traced in their composition. They have no fat either in a diseased or natural condition. The membranes do not exhibit a fibrous appearance; but seem like dense

gluten, or coagulable lymph. Being designed to remain in the body only for a short time, their structure is suited to the end which they are ~~designed~~ destined to fulfil. —

We now proceed to give an account of the nourishment of the Fœtus in Utero. — Numerous as are the speculations on this subject, they may all be referred to one or the other of these sources: — 1st. that the child derives its support from the liquor amnii; 2nd. that nourishment is conveyed to it through the umbilical vessels. — In another place, (the Eclectic Repertory,) I have examined the grounds on which the 1st. opinion rests, and have shown that its only claim to notice is the respectable names which are connected with it. ~~I shall~~ Contented with referring you to this book for a more complete account of the objections against this doctrine, I shall at present only mention some of the most prominent. 1st. ~~It~~ The liquor amnii cannot serve the purpose attributed to it, because it is not nutritious, being entirely

of those properties which ~~enable~~ ~~support~~ render a substance fit for supplying nutriment to the fœtus. Nay, in the latter stage of ~~pre~~ gestation, it often becomes acrid, fecculent, and putrid. 2nd. Its quantity is in ~~the~~ an inverse ratio to the size of the fœtus, and sometimes it is almost totally wanting. I have known a case where the membranes were ruptured a week or more before delivery, and yet the child, when born, showed no signs of emaciation. 3rd. The fœtus in some instances has existed with the intestinal canal so closed, that it would be impossible for any fluid matter to enter it. — I have seen as many as 30 cases of this nature. ——— 4th. Previous to the expiration of the ~~4th~~ ~~4th~~ 3rd month, the stomach & intestines are in a pulpy condition, totally unable to perform any action by which alimentary matter could be converted into ~~fluid~~ chyle. It would seem that during the growth of the fœtus no organic function should be performed. The evolution of the different parts

is the only end that is aimed at. All the organs, with one or two exceptions, remain inactive. The Heart & blood-vessels are the only ones which act to any great extent. The brain is not endowed with its peculiar energy; the stomach & intestines are without the power of digestion; the glands without secretion; the muscles without motion; the senses without sensation; the absorbents without absorption. Whatever, therefore, may be the precise mode of nourishment, the organic action of the fœtus has little concern in the process. No other proof of this is wanting, than that the ~~child~~ fœtus continues to grow, though destitute of one or more of those organs, ~~the~~ without which life, ~~in~~ after birth, could not be retained. We have many cases on record, where the fœtus attained its full size though destitute of some or of the following parts; viz. the brain, heart, lungs, and ~~one~~ the several abdominal viscera. — The subsistance of the fœtus is purely parasitical.

Its food is ~~fitted to enter it~~ prepared by the organs of the mother, and is wholly destitute of excrementitious parts, before it enters the child. On this account it is that there are no excretions in the fœtus. Urine, upon examination, has not been detected in the bladder, and what is called meconium is not formed from food out of which the nutritive matter has been extracted. — I have now completed the refutation of the 1st hypothesis, & shall proceed to the Second, which is ~~much more~~ in itself so plausible, ~~& has a proportionably great number of supporters~~ that it challenges our most serious considerations. —

Lec. 6th. The theory now under examination may be traced to the remotest period of antiquity. It was taught in the schools of stoics; but by what disciples of this sect of philosophers it was originated is not known to me. Entombed during many centuries, it was again revived about the æra of the discovery of the circulation of the blood; and subsequently,

with a few varieties, has been the prevailing opinion. At its restoration, and ever long after, it was generally believed that there existed a direct vascular connection between the fœtus & the parent, through the medium of the placenta. But the reverse is at present satisfactorily proved. We may, indeed, affirm that there is no point in anatomy more completely settled. This being the case, it is unnecessary to waste our time, by entering into a minute detail of the particular circumstances which render the opinion of a direct communication no longer tenable. Nevertheless I desire to satisfy all minds; and for this purpose shall state some of the objections which may be urged against the theory. —

The alledged vascular connection between the fœtus & parent, is disproved 1st by the total failure of all attempts to detect its existence by injections; 2nd by the want of correspondence in the pulsations of the Umbilical Chord, & the Maternal arteries; and 3rd by the difference between the

fœtal & parental blood. – To these facts we may add a ~~too~~ consideration of great weight; – viz. – that if, as contended for, the blood of the mother enters unaltered into the fœtal economy, a transfusion of ~~blood~~ that fluid takes place from one individual into the vessels of another, without having undergone any process of assimilation, to adapt it to the peculiar constitution & exigencies of the recipient system. Injurious as such an arrangement must necessarily prove, still greater damage would result from the ~~propulsion of the blood~~ propelling power of the maternal heart and arteries. Driven by the energy of these organs, the stream of blood would crush & reduce to a chaotic mass the delicate organs of the embryo, or even of the full grown fœtus. A consequence so fatal has been sedulously guarded against by a process of nature which I will presently point out. – As the direct communication could not be maintained, another mode of explanation was resorted to. It was now averred

* See Blumenbach's Physiology.

that the nourishment of the fœtus was effected ~~by~~ in the following manner. The umbilical arteries pour out their blood into the cells of the placenta, whence it is taken up by the uterine veins, & having been circulated through the maternal system, is reconveyed to the same cells by the uterine arteries. From these it is again taken up by the vein of the umbilical chord, & carried through the body of the fœtus, fit for its nourishment. To prove that this is the prevailing opinion at the present time, I will ~~cite~~ read to you a passage from Blumenbach's Physiology*. The doctrine, however, as here announced, does not approach nearer the truth than the previous one. - The circulation of the chord, & of the uterus are wholly distinct, & independent of each other. The placenta, as I before stated, is composed of 2 parts, the fœtal & the maternal. The first is made up of the ramifications of the umbilical

vessels; the 2nd. of the vessels of the Uterus, with the interposition of cellular texture. The vessels, however, of the two parts are more or less blended, but they never unite, or inosculate. This may be demonstrated by exposing the placenta to maceration, & pulling out the vessels, which may be separated from the mass without any alteration. Two plants growing near each other in a loose soil, whose roots though entangled do not unite or inosculate, present not a slight resemblance to the structure of which we are speaking. Hence it follows that the account of the fœtal circulation as given by Modern Philosophers is egregiously wrong. That the blood is effused by one set of vessels & absorbed by another, is entirely a creature of the imagination. The arteries of the chord have no exhalent outlet, but run on without any interruption of their continuity, into the corresponding veins; so that the blood flows from one into the other without the loss of a single particle. The vessels of the Uterus, on the contrary, have an exhalent outlet or secretory duct, through which a fluid destined for the nourishment of the fœtus is poured

out into the cells of the maternal portion of the placenta, while the main current of blood is conveyed back in the veins of the Uterus. The fœtal has a great resemblance to the ~~maternal~~ pulmonary circulation; and the other, or that which takes place in the maternal part of the placenta, may be compared to what happens in the Corpora Cavernosa penis. Be this, however, as it may, there is at least no vascular communication between the parent & the fœtus. The evidence in support of this ~~truth~~ fact, is clear, concise, & irresistable. — That it is correct may be proved by injection. Let any liquid however subtle, penetrating, ~~be injected~~ as mercury, or spirits of turpentine, be injected into the umbilical artery, and the whole will return through the umbilical veins without the loss of a single drop. This experiment was first made by the two Munros of Edinburg, & by Jno. Hunter; and were repeated with the same result in this University. If, on the contrary, we inject the uterine arteries, the uterine veins, & the cells of the maternal portion of the placenta will be filled; but not an atom will be found in the vessels of the fœtus. These experiments have been too often repeated with the same result to leave any doubt of their accuracy; and they are supported by considerations too important to be overlooked. In the 1st. place, it is well known that after the expulsion of the child, when we cut the chord, no ~~than~~ more blood escapes from the maternal portion, than what remains in it at the time of division, amounting, generally, to about a tea-spoon full. Secondly, It appears that the fœtus is not affected by hemorrhage from the parent. A remarkable case is recorded of a woman who died to death, and at the instant of dissolution was delivered of a vigorous & healthy child. Every practitioner has seen the same thing in the profuse floodings which sometimes attend parturition, by which the fœtus is not at all affected. — Nor is the converse of what I have stated less ~~true~~ accurately ascertained. The mother is not at all injured by hemorrhage from the fœtus. In the operation ~~by which the cranium is opened~~

for opening the cranium of the child, nearly all the blood of the fœtus, amounting to several pints, necessarily escapes. But the woman, debilitated as she must have been by her previous suffering, (for this operation is admissable only in extreme cases) does not seem to be at all exhausted by this loss of blood; which she would not fail to be were it detracted directly or indirectly from her system. — Thirdly — It has been of late discovered, that when, by a strong parturient pain, the placenta has been expelled simultaneously with the child, the circulation in the chord continues for some time, provided the child does not respire; but if respiration take place, the pulmonary circulation is established, and the other, of course, ~~cease~~ is interrupted. This fact was first observed by Dr. Pofreau & myself, who made the discovery about the same time. By placing the child with the placenta in a tub of warm water, the umbilical circulation could be made to continue from 10 to 20 minutes. A case of the kind happened to two of my students, when the period was protracted to more than an hour. These are both men of unquestioned veracity, & their word cannot admit of dispute. There is also a ~~fact~~ case of the same nature recorded, with great precision, in a number of the medico-physical journal of London. — Let the fact be admitted, (and I can see no reason why it should be doubted,) and there is at once an end of all disputation on the question before us. — But additional testimony may be adduced. It is well known that all the lower animals, the monkey, perhaps, excepted, have not their placentas deciduous as in the human species, but divided into two portions one of which, belonging to the mother, is permanent; the other, belonging to the fœtus, is discharged at every birth. Now the separation of these portions is never attended with a loss of blood; which could not be the case, were the circulation continuous, or carried on by effusion, & reabsorption. ~~Experiments~~ ~~two~~ No one has ever heard of a mare's bleeding to death at the delivery

of a colt. Experiments, indeed, with injections show that no such connection exists in this case. — There are some animals in which the two portions of the placenta have so little resemblance, that it is impossible they should be connected in ~~the way~~ a manner calculated for a circulation according to the generally received doctrine. Thus in the Deer the umbilical portion is highly coloured, & very vascular; while the uterine is ~~without vessel~~ apparently without vessels, & of a gelatinous consistence. So in the Rabbit one part is of a bright red, & replete with blood vessels; while the other is white, & shows no signs of vascular organization. — To conclude this part of our inquiries, I will relate some experiments which I made some time ago, and which go to confirm what I have already advanced. — Experiment 1st. I opened the side of a pregnant bitch, and divided the umbilical vein; — as I anticipated, the hemorrhage was profuse, and the fœtus on being examined was found to be almost entirely exhausted of blood. ~~But~~ Repeating the experiment, I ligatured the chord, & no hemorrhage resulted. — Exper.t 2nd. — By opening the carotids of a pregnant bitch, I bled her to death: the fœtuses were not diminished in size, and the umbilical portion of the placentas contained the usual quantity of blood; while that of the mother was entirely empty. — Experim.t 3rd. Knowing that madder when admitted into the system deposits its colouring principle in various parts, I fed a pregnant bitch on food mixed with it. On ~~opening~~ examining the animal I found ~~various~~ the red ~~colo~~ colour deposited in different places throughout her body, but no signs of it could be detected in the fœtus or liquor amnii. — In the prosecution of these experiments, I had various opportunities of observing the difference between

the fœtal and maternal blood. I found that the former is less florid, and exhibits signs of imperfect elaboration. By Bichat the same account is given, and Fourcroix, if I am not mistaken, discovers a considerable ~~in~~ difference in the results yielded from the two kinds of blood, by Chemical analysis. — — Taking into consideration the whole of what has now been advanced, I think we are entitled to the conclusion that the fœtus fabricates its own blood; and is only dependent on the mother for the supply of materials. This is nothing more than what every one admits to be carried on in the egg. All confess that the chick produces its own blood; and I cannot see why the fœtus of viviparous animals, which possess the same apparatus, should not be equally capable of fabricating ~~its blood~~ that fluid for itself. — By a renunciation of the opinion we have been combatting, we are thrown upon the difficult inquiry of what are the uses of the placenta. To me, however, they are not so obscure, and appear to be two-fold. — First: It is probable ~~can~~ that the blood in passing through the placenta, undergoes changes analogous to those ~~effect~~ effected on the maternal blood by the pulmonary apparatus. This opinion was first thrown out by the celebrated Mayo, & was subsequently adopted by Sir E. Hulton, a court physician in the reign of Charles 2nd. After this period it was lost sight of, till it was again taken up by Dr. Jeffries the present professor of anatomy in ~~Edinburgh~~ Glasgow, and by Dr. Prescot of Cambridge. Both of them maintained the doctrine in their inaugural dissertations, which I have never been able to obtain. I understand however that the principle arguments they make use of are the following. — 1st. The placenta ~~bears the~~ resembles the lungs in its structure & appearance. — 2nd. The whole blood of the fœtus passes through it. 3rd. Compression of the Umbilical Chord destroys life in the fœtus, as soon as compression of the trachea after birth. 4th. The blood returns from the placenta, having undergone a change from a dark venous, to

a florid arterial colour. The last of these is well established is conclusive. But as to the fact there is some difference of opinion. By many physiologists it is denied that such a change does take place. On the contrary it is maintained by an equal weight of authority that the fact does not admit of a doubt. Dr. Jeffries calls the blood in the umbilical vein, "vivida et florida". My own experience teaches me that though there is not so great a change as is here affirmed, yet that some does evidently take place. The circumstance that the blood of the fœtus is not so bright as that of the child after birth, arises from the peculiarities of the economy of the former. Surrounded on every side by ~~the~~ the proper temperature ~~equal to its own~~, it requires none of those Chemical actions in its own frame, which while they evolve heat, communicate, at the same time, a bright tint to the blood. It may here be demanded whence comes the oxygen. Difficult as the question is, it is not incapable of solution. Some provision has been supposed to exist in the placenta, like that in the egg by which its blood undergoes a change. But, throwing ~~as~~ aside this conjecture, may we not suppose that in the ramifications of the fœtal veins, an absorption takes place from the neighbouring arteries of the mother. The fœtal & maternal vessels inosculate in such a manner that this absorption may be very well conceived to be carried on.

Second. ~~A second use of the placenta is to secrete a fluid for the nourishment of the fœtus.~~ Besides decarbonating, or oxigenizing the blood the placenta also secretes a fluid for the nourishment of the fœtus. It is affirmed by the highest authority that such a fluid exists in the cells of the placenta in other animals, and many celebrated physiologists maintain that it is to be found in that of women. Harvey, Haller, Blumenbach, Loewenhorn, Burns &c. admit it as a matter of their own observation. It is even termed by Harvey the albuminous liquor. In those animals

which have their placenta constructed with eminences on one part and corresponding depressions on the other, this fluid, soon after the death, may be seen oozing from the papillæ into the cotyledons. In the Human Species it is said to be secreted by the uterine ~~Species~~ arteries into the cells of the placenta; which fact, independent of observation, is confirmed by the structure of that organ. What other office can the cells & outlets before mentioned be intended to perform? There is another circumstance which will give us some insight into the ~~mode in which it~~ end for which the fluid ~~is secr~~ is destined. — The connection between the Uterus & mammæ, both in health and disease is extremely close. Coeval in their developement, these two organs harmonize in all their actions, and are distinguished by simultaneous changes. But this is not invariably the case; for there are instances where they are alternately, or even oppositely affected. The anastomosis between the internal mammary, & the epigastric artery, here affords one of the most beautiful explanations, which has ever been ~~afforded~~ given of any phenomenon. I said that the actions of the Uterus & breast are sometimes opposite. As examples of this I would mention the suppression of the catamenia during lactation,

and the interruption of the secretion of milk so long as the menses recur with regularity. Nor is this all. These organs not unfrequently exchange their functions. Thus in the state of pregnancy the nourishment of the fœtus is committed to the uterus; but after the child is born, this duty devolves upon the mamma. In this instance the epigastric artery, which during gestation was large, becomes contracted when lactation commences, & a determination of blood takes place to the breasts. That the uterus is capable of this secretory ~~effect~~ office, is shown by the fact that when milk is suppressed by what is commonly called a cold, or by other causes, a discharge from the vagina is very apt to occur, resembling ~~milk or~~ chyle in its appearance. Nor is it less ~~true~~ that when the milk ~~does~~ is not secreted within the usual time after delivery, the lochia are increased in quantity, and of a white colour. By allowing the existence of this uterine secretion, we have developed a method of fœtal nourishment; & the principal difficulty at present is, to explain in what manner the fluid is conveyed

into the system of the fœtus. — By Harvey it was conjectured that this fluid aliment was absorbed by the radicals of the umbilical veins. This is not the case; and it has been accurately ascertained that the vein performs ~~another~~ a different function, ~~an~~. Nor is it less certain that the power of absorption in veins, if it exist at all, is ~~confined to blood~~ limited to blood. To me it is manifest, that the fluid is taken up by a set of absorbents which open into the cells of the placenta, and running along the umbilical chord, terminate in the ~~pl~~ liver; where ~~the~~ it undergoes changes that accomodate it for an entrance into the circulation of the fœtus. That the ~~liver~~ liver performs such an office, is ~~[illegible]~~ highly probable from its prodigious size. I am perfectly aware that the hypothesis which I have just advanced, wants the support of well established facts. There is ~~no~~ every reason to ~~doubt~~ believe that absorbents enter into the composition of the umbilical chord, though no one has perfectly demonstrated their existence. Dr. Monro of Edinburg states that on one occasion he saw the lymphatics

in the chord; and a German anatomist went so far as to say that he absolutely injected them. Notwithstanding the aspersions of these individuals, I am willing to admit that their observations stand in need of confirmation. But may not the fact that the absorbents have not yet been discovered, be owing to a deficiency of minute examination. Confident that the fœtus was supported by the maternal blood, physiologists have not been inclined to search for other means. But, because they have not been detected, are we therefore altogether to deny their existence? In fact we have the same evidence that they exist here, as that they do so in many other parts of the body. No absorbents have been detected in cartilage, in bone, in some parts of the brain; yet their existence in these parts is universally admitted. It is extraordinary that it should ever have been contradicted. They are as necessary to the living body, and to every portion of it, as the blood-vessels themselves. They are antagonizing powers, and are always found together. Without either of them growth or reproduction could not be effected. Deprive any part of the body either of absorbents, or of blood-vessels, — it would

inevitably fall into a mass of ruin. When we see a certain order of things, the production of which requires a certain agency, we conclude that this agency exists, though no other proof be afforded. ~~The fluid sinks into the cells of the placenta, must be carried to the fetus either through the~~ The Fetus must be supported either ~~by the~~ through the Umbilical chord, or by means of the absorbents. There is no other way in which such an end could be accomplished. If then we show that it is not effected by the former, we are authorized by all the rules of correct philosophizing in referring it to the latter. This reasoning may seem inconsistent with that which I adopted on a former occasion, when endeavouring to show that the semen could not be conveyed to the ovary by a set of absorbent vessels. - There is a wide difference between the cases, & I am not, therefore, liable to the charge of inconsistency. The absorbents of the Vagina have been distinctly traced, and not one has been seen passing in the direction of the ovaria. Besides, the objection that lymphatics ascinclate whatever is

received in their cavities, does not apply in this instance. — Some allege, that, even admitting the existence of these absorbents for which I contend, ~~they are~~ vessels so small as entirely to elude our researches, can answer no such purpose as that which I have assigned them. But we should recollect that, as the fluid comes ~~to the fœtus~~ from the placenta perfectly elaborated by the vessels of the mother, ~~and having~~ it has no excrementitious particles to be thrown off; and, consequently, that a small portion only is required for the nourishment of the fœtus. The reason that we demand so much for our maintenance, is that a great proportion of whatever we take is excrementitious, and consequently is not adapted for nourishment. Here, on the contrary, the food has been prepared by the mother, & every particle of it, when introduced into the fœtal system, serves for its support. As the process by which the embryo is nourished, is well ascertained ~~in every~~ in oviparous animals; let us see what assistance our hypothesis can derive from analogy. By my own experiments, confirmed by

more than one of the graduates of this University, it has been clearly ascertained, that about the 3rd. day of incubation, the Umbilical chord of the chick begins to pullulate or project. At the expiration of the 8th. day it reaches the follicular aeris, or air bag, at the large end of the egg. The air in this reservoir has been proved to be pure oxygen. ~~Thus far the analogy with viviparous animals is complete. At in this~~ The chord, moreover, as in viviparous animals, consists of 2 arteries and one vein; and the blood, which in going was dark, in returning is florid. - ~~The~~ As the blood vessels enter the vitellus or the albumen. -- The vitellus or yolk serves for the nourishment of the chick, but is not introduced into its system through the Umbilical chord. This office is accomplished by a small duct, of the nature of a lacteal or absorbent, which runs from the ileum to the vitellus, about ¼ of an inch in length, and called from its discoverer Ductus intestinalis stenonis. Notwithstanding what has been asserted to the contrary, the

albumen does not serve for fœtal nourishment; nor is it ever mingled with the vitellus. They are seperated by the membranes ~~which include them both~~, with which each of them is invested. The uses of the Albumen seem to be the same with those of the liquor amnii. Both surround ~~the~~ and protect the fœtus; and both gradually waste as this increases. By the Vitellus not only is sufficient nourishment supplied for the chick while in the egg; but a portion is also left ~~for~~ to ~~its~~ support ~~after~~ it for some time after it escapes; till it ~~is~~ has gathered strength enough to enable it to ~~eat~~ pick up its food. It sometimes happens that ~~to~~ on account of too sudden a contraction of the Umbilical chord, this residuary portion is included; & in all such cases the chick dies immediately after being hatched. — Let us trace the parallel ~~with~~ ~~more~~ ~~precisely~~ between ~~in both instances in~~ the progress in the oviparous & ~~viz~~ viviparous animals. In both instances, the Umbilical ~~&~~ circulation, which

conveys the blood of a dark & venous, returns it of an arterial colour. The resemblance in this respect is perfect. To complete the view we have only to show that the nourishment is accomplished in the same manner. In the egg we have seen that the Vitellus is subservient to this purpose, by means of a duct resembling a lacteal or absorbent, which opens into the intestines. Does not the same take place in viviparous animals. In the placenta there is an accumulation of a milk-like fluid destined for the same end, and a set of lymphatics must ~~exist, be appropr~~ be appropriated to its conveyance, because this could be done by no other agency.—

On the whole, there is a most striking analogy in every leading point, and in this analogy we have presented to us a beautiful exemplification of the simplicity of nature in every important process.—

is indeed a partner in the trade.

pressed his brother's hand; and often bade

The Brother and Sister; or, mental excellence superior to personal beauty.

WARN'D by our counsel oft beware,
And look into yourselves with care.
There was a certain father had
A homely girl and comely lad.
These being at their childish play
Within their mother's room one day,
A looking-glass was in the chair,
And they beheld their faces there.
The boy grows prouder as he looks;
The girl is in a rage, nor brooks
Her boasting brother's jests and sneers,
Affronted at each word she hears.
Then to her father down she flies,
And urges all she can to bias
Against the boy, who could presume
To meddle in a lady's room.
At which, embracing each in turn
With most affectionate concern,
"My dears," said he, "you must not pass
A day without this useful glass:
You, lest you spoil a pretty face,
By doing things to your disgrace—
You, by good conduct to correct
Your form, and beautify defect."

SMART.

'Tis thus, that on the choice of [illegible]
Our good or evil name depends.

Christian morality.

——————'Tis our part,
As Christians, to forget the wrongs we feel;
To pardon [illegible] sees: our very foes
To love and cherish; to do good to all:
Live peaceably; and be, in all our acts,
Wise as the serpent, gentle as the dove.

Hope in affliction.

——————Shall we pine,
And be dishearten'd with a day of grief,
When the same hand that brought affliction on,
Retains its pow'r, and can, with equal ease,
Remove it?

Folly of envy.

Can you discern another's mind?
Why is't you envy? Envy's blind.
Tell Envy, when she would annoy,
That thousands want what you enjoy.

The wish.

I sigh not for beauty, nor languish for wealth;
But grant me, kind Providence! virtue and health:
Then, richer than kings, and more happy than they,
My days shall pass sweetly and swiftly away.